

Description

FENCE CLIP LOCKING TOOL

BACKGROUND OF INVENTION

1.FIELD OF THE INVENTION

[0001] The present invention relates generally to tools for fastening fencing wire to fence posts, and more particularly, to a fence clip locking tool configured to facilitate bending of a fence clip, when the clip is used to attach fencing wire to a post.

2.DISCUSSION OF PRIOR ART

[0002] Wire fencing is commonly used to provide a visible identifier of property boundaries, discourage trespassing, and control the ingress and egress of animals. These fences usually consist of pluralities of fence posts, fencing wires and wire clips that function to secure the wires to the posts.

[0003] Conventional methods of installation and maintenance of wire fencing typically include the highly repetitive and unconventional use of common tools, such as screwdrivers

and pliers, for bending the clips around the wire. However, the unconventional use of these tools during fencing applications often present ergonomic and efficiency problems. The configuration of these tools often results in undesirable and sometimes painful contact between the user and adjacent wires. Furthermore, the unintended use of these tools can often damage the tools or lead to early degradation. In response to these concerns, specialized tools have been developed for installing the wire clips. However, these specialized tools often present complex modes of operation and cumbersome structure that must be repeatedly positioned and supported by the user.

SUMMARY OF INVENTION

- [0004] Responsive to these and other problems, the present invention concerns an improved fence clip locking tool. Among other things, the tool is useful for bending a wire clip around an adjacent fencing wire. The tool is further useful for providing a more ergonomic configuration that reduces the transfer of friction to the user.
- [0005] A first aspect of the invention concerns a fence clip locking tool for bending a clip to secure a fencing wire to a fence post. The fence clip locking tool includes an elongated rod presenting opposite spaced apart ends and a

handle angularly projecting from the rod. The rod is configured to engage the clip between the ends and to facilitate bending of the clip during securement of the fencing wire to the fencing post. The handle includes a rotatable handle cover to be grasped by a user.

[0006] A second aspect of the invention concerns a fence clip locking tool for bending a clip to secure a fencing wire to a fence post. The fence clip locking tool includes a handle for grasping by a user and an elongated rod angularly projecting from the handle. The rod presents opposite spaced apart ends and an arcuate clip engaging portion extending between the ends. The clip-engaging portion is configured to engage the clip and facilitate bending of the clip during securement of the fencing wire to the fencing post.

[0007] Other aspects and advantages of the present invention will be apparent from the following detailed description of the preferred embodiment and the accompanying drawing figures.

BRIEF DESCRIPTION OF DRAWINGS

[0008] Several embodiments of the invention are described in detail below with reference to the attached drawing figures, wherein:

- [0009] FIG. 1 is a perspective view of a fence clip locking tool constructed in accordance with a first embodiment of the present invention, a fence post, a plurality of fencing wires, and two fence clips, particularly illustrating the tool in the initial position;
- [0010] FIG. 2 is a perspective view of the tool, post, wires, and clips as shown in FIG. 1, particularly illustrating the tool in an intermediate position;
- [0011] FIG. 3 is a perspective view of most, but not all, of the structure shown in FIGS. 1 and 2, particularly illustrating the tool in the final position;
- [0012] FIG. 4 is a perspective view of the tool, particularly illustrating the arcuate clip-engaging portion of the rod;
- [0013] FIG. 5 is a cross-sectional view of the tool, wires, wire clip and fence post taken along line 5-5 of FIG. 1, particularly illustrating the tool and loop end section of the clip in the initial position in solid line, and the tool and loop end section in an intermediate position in phantom line;
- [0014] FIG. 6 is a cross-sectional view of the tool, wires, wire clip, and fence post shown in FIG. 5, particularly illustrating the tool and loop end section in another intermediate position in phantom line, and the tool and loop end section in the final position in solid line;

[0015] FIG. 7 is a cross-sectional view of the tool, wires, wire clip and fence post taken along line 7-7 of FIG. 1, particularly illustrating the tool and hook end section of the clip in the initial position; and

[0016] FIG. 8 is a perspective view of a fence clip locking tool constructed in accordance with a second embodiment of the present invention, particularly illustrating the linear rod configuration.

DETAILED DESCRIPTION

[0017] FIGS. 1-3 illustrate an improved fence clip locking tool 10 constructed in accordance with a preferred embodiment of the present invention and configured to facilitate the bending of a plurality of wire clips 12 around a pre-positioned fencing wire 14 by a user (not shown). The wire clips 12 are configured to secure the fencing wire 14 to a plurality of fencing posts 16 to effect the installation or repair of a typical wire fence. FIG. 1 shows the tool 10 in an initial position prior to bending a clip, FIG. 3 shows the tool 10 in a final position after bending, and FIG. 2 shows an intermediate position between the initial and final positions.

[0018] As illustrated, the preferred fencing post 16 is a T-shaped fence post including a main panel 18 having first and sec-

ond faces 20,22, an orthogonal bisector panel 24 projecting from the longitudinal mid line of the first face 20, and a plurality of equally spaced projections 26 on the second face 22. The projections 22 of interconnected posts 16 are preferably aligned so as to guide the lateral placement of the wires between the posts. The preferred fencing wire 14 is a smooth cylindrical wire of standard fencing gauge (e.g., ten to sixteen gauge wire). The wire 14 is preferably pre-tensioned to a predetermined tensile force to provide a more rigidly taught barrier. Most preferably, the wire 14 is pre-tensioned to a tensile force within the range of about two to three hundred pounds.

[0019] It is within the ambit of the present invention, however, to use the fence clip locking tool 10 to fasten alternative fencing wires to fence posts 16, to fasten fencing wire 14 to alternative fence posts, or any other combination thereof. For example, the tool 10 may be used to fasten barbed wire or diamond wire to a wooden post.

[0020] The wire clips 12 are preferably conventional in construction, and it shall therefore be sufficient to explain that each clip 12 presents a bent cylindrical clip bar extending between first and second clip ends. The clip 12 is configured to at least partially encircle the post 16 in the clip

fastening position shown in FIG. 1. Adjacent the first clip end, the clip bar is further bent to present a U-shaped hook end section 28 (see FIG. 7). The hook end section 28 engages the wire 14 in the fastening position by insertably receiving the wire 14 within the U-shape. Adjacent the second clip end, the clip bar is further bent to present an overhanging loop end section 30 (see FIGS. 1-3 and 5). The loop end section 30 presents a first U-shaped loop bend 32, which lies substantially in a plane that is generally parallel to the wire 14 when the clip 12 is in the fastening position. In the fastening position, the first U-shaped loop bend 32 extends downward from the wire 14 and towards the user. The loop end section 30 overhangs the wire 14, so as to cooperatively form a loop opening (not shown) with the wire 14. The wire clip 12 is malleable so that the loop section 30 can be bent by the user to present a bend 34 that engages the wire 14 similarly to the hook end section 28. Thus, in the final position, it is appreciated that the hook and loop end sections 28,30 present latching clip ends that cooperatively exert a holding force upon the wire 14 to thereby secure the wire 14 against the post 16.

[0021] As best shown in FIGS. 1-4, the fence clip locking tool 10

generally includes an elongated rod 36 and a handle 38 extending angularly from the rod 36. More preferably, the handle 38 extends transversely from the rod 36, such that the rod 36 and handle 38 define an angle between the range of about twenty to one-hundred and sixty degrees. Most preferably, the handle 38 orthogonally extends from the rod 36. The angular orientation of the handle 38 relative to the rod 36 facilitates the application of the bending torque by the user, as will subsequently be described herein.

[0022] The preferred rod 36 presents an elongated cylindrical bar that defines a distal rod end 40, a handle end 42, a rod diameter, a longitudinal rod length, and an arcuate clip-engaging portion 44. The rod 36 is preferably solid along the entire rod length. However, the rod 36 may define an open inner space along at least a portion of the rod length, wherein a free end of the wire clip can be inserted to further bend the wire clip. The rod 36 more preferably presents a rod length within the range of about two to ten inches. Most preferably, the rod length is about five inches. The rod 36 presents a sufficient diameter and is formed of material having sufficient strength to bear the anticipated bending torque applied by the user. More

preferably, the rod 36 presents a diameter not less than one-fourth of an inch and is formed of cold rolled carbon steel, although other high strength materials, such as a high grade plastic, can be utilized. The maximum diameter of the rod 36 is limited by the size of the loop opening.

[0023] As previously mentioned, the preferred rod 36 also defines an arcuate portion 44 that extends between the distal and handle ends 40,42. The arcuate portion 44 is dimensioned to facilitate the user to achieve a full one-hundred eighty degree swinging motion (see FIGS. 5 and 6), where the distance between adjacent vertically spaced wires is less than the rod length or where other barriers are present. More preferably, the portion 44 presents an arc having a radius within a range of about six to twenty-four inches. The illustrated arcuate portion 44 is defined along the entire rod length. However, the arcuate portion 44 can be defined by a fraction of the rod 36, and can be presented adjacent either the distal or handle end. More preferably, the arcuate portion 44 presents an arc-length that is not less than seventy-five percent of the rod length.

[0024] The handle 38 includes a center shaft 46, a rotatable

cover 48, and an end cap 50. The preferred center shaft 46 is integrally formed with the rod 36, so that the shaft and rod present a bent unitary bar. Thus, the center shaft preferably presents a similar cross-section and is formed of similar material to the rod 36. The center shaft 46 preferably extends from the handle end 42 of the rod 36, and presents a handle length sufficient to enable the user to easily grasp the handle 38. More preferably, the handle length is within the range of about two inches to six inches; and most preferably the handle length is about three inches long.

[0025] The rotatable cover 48 presents a tubular body that is open along its entire length and at first and second cover ends. The cover 48 defines an inside diameter that is slightly larger than the diameter of the center shaft 46, so that the center shaft 46 can be insertably and rotatably received within the cover. The preferred cover 48 is freely rotatable on the shaft 46. If desired, the inside diameter may be sufficiently sized to further receive a lubricant layer interposed between the cover 48 and shaft 46. The cover 48 defines an outside diameter that enables the comfortable grasping of the handle 38 by the user. More preferably, for a one-fourth inch diameter shaft 46, the

cover 48 presents an inside diameter not less than five-sixteenth of an inch, and an outside diameter within the range of about three-quarters of an inch to about one inch. The cover 48 presents a length slightly shorter than the length of the center shaft 46, so that a small fraction (not shown) of the inserted center shaft 46 is left uncovered when the cover 48 is placed adjacent the rod 36. The small fraction is sufficiently sized to enable the attachment of the end cap 50 that retains the cover 48 in a generally fixed position along the longitudinal length of the center shaft 46. A washer 52 is preferably provided to snugly retain the cover 48 in the desired position on the shaft 46. The end cap 50 and washer 52 are commonly known in the art, and therefore will not be further described herein. However, it is preferred that the cover 48, end cap 50, and washer 52 be formed of non-conductive material, such as wood, rubber or plastic, so as to protect the user from electric current, if any, within the wire 14.

[0026] Alternatively, it is certainly within the ambit of the present invention for the tool, as otherwise described herein, to provide a linearly configured rod that does not present an arcuate portion as shown in FIG. 8.

[0027] In operation, the wire clip 12 is placed in the fastening

position, wherein the hook end section 28 engages and the loop end section 30 overhangs the pre-positioned and preferably tensioned fencing wire 14. The tool 10 is placed in the initial position, as shown in FIGS. 1 and 5, wherein the handle 38 is projected away from the fence post 16, the arcuate portion 44 of the rod 36 is bowed outward toward the user, and the distal end 40 of the rod 36 is inserted into the loop opening an inserted distance. The user then swings the handle 38 along a preferred arc defined by the initial, intermediate and final positions shown in FIGS. 1–3 and 5–6. Where necessary to avoid obstruction, as the handle 38 is swung the user can progressively insert the rod 36 into the loop opening, so that the inserted distance gradually increases and the arc defined by the handle forms a spiral about the wire 14 (compare FIGS. 5 and 6).

[0028] As the handle 32 is swung, the arcuate portion of the rod 30 pivots about a contact point with the clip 12, while the distal end of the rod engages the wire 14. The wire 14 presents a bending capacity greater than the bending strength of the clip 12, so that the clip 12 bends as the handle 38 is swung downward towards the final position. It is appreciated by those ordinarily skilled in the art that

the lever arm provided by the rod 36 presents a mechanical advantage between the force applied by the user and the resultant bending force applied to the clip 12, that is proportional to the rod length and the inserted distance. It is further appreciated that, the static friction between the handle cover 48 and the center shaft 46 is less than the static friction between the user and the cover 48, so that the cover 48 slides along the contact surface between the cover 48 and center shaft 46, and thereby provides rolling engagement between the user and shaft 46.

[0029] After the handle 38 is swung to the final position, the tool 10 is withdrawn from the loop opening. The user can then proceed to a second intersected post to further secure wire 14, by placing a new clip in the fastening position and repeating the steps as described above. Preferably, adjacent wires are staggeredly fastened at every third post along the fence, so as to present the wire clip pattern shown in FIG. 1.

[0030] The preferred forms of the invention described above are to be used as illustration only, and should not be utilized in a limiting sense in interpreting the scope of the present invention. Obvious modifications to the exemplary embodiments, as hereinabove set forth, could be readily

made by those skilled in the art without departing from the spirit of the present invention.

[0031] The inventor hereby states his intent to rely on the Doctrine of Equivalents to determine and assess the reasonably fair scope of the present invention as pertains to any apparatus not materially departing from but outside the literal scope of the invention as set forth in the following claims.